



3. B.Sc. (Hort.) SECOND YEAR FIRST SEMESTER

3.1 Commercial Floriculture [FLA 211] 3(2+1)

Theory:

Scope and importance of commercial floriculture in India, production techniques of ornamental plants like rose, marigold, *Chrysanthemum*, orchid, *Carnation*, *Gladiolus*, jasmine, *Dahlia*, *Tuberose*, bird of paradise, china aster and gerbera for domestic and export market, growing of flowers under protected environments such as glass house, plastic house etc., post harvest technology of cut flowers in respect of commercial flower crops, dehydration technique for drying of flowers, production techniques for bulbous.

Practical:

Identification of commercially important floricultural crops. Propagation practices in *Chrysanthemum*, sowing of seeds and raising of seedlings of annuals. Propagation by cutting, layering, budding and grafting. Training and pruning of roses. Use of chemicals and other compounds for prolonging the vase life of cut flowers. Drying and preservation of flowers. Flower arrangement practices.

Reference books:-

1. Floriculture in India- Randhawa and Mukhopadhyaya
2. Introductory commercial floriculture- Arora
3. Gardening in India- Percy Lancaster
4. Flowering Trees- M. S. Randhawa
5. The Rose in India- B. P. Pal
6. Beautiful Shrubs- Pratibha. P. Trivedi
7. Commercial Floriculture- Prasad and Kumar
8. Floriculture and Landscaping- Bose, Maiti, Dhua and Das (eds.)



3.2 Diseases of Fruits, Plantation, Medicinal and Aromatic Crops [PPT 212] 3 (2+1)

Theory:

Etiology, symptoms, mode of spread, epidemiology and integrated management of the diseases of fruits, plantation, medicinal and aromatic crops viz., mango, banana, grape, citrus, guava, sapota, papaya, jack fruit, pineapple, pomegranate, ber, apple, pear, peach, plum, almond, walnut, strawberry, areca nut, coconut, oil palm, coffee, tea, cocoa, cashew, rubber, betel vine *Senna*, neem, hemp, *Belladonna*, *Pyrethrum*, *Camphor*, *Costus*, *Crotalaria*, *Datura*, *Dioscorea*, mint, *Opium*, *Solanum khasianum* and *Tephrosia*. Important post-harvest diseases of fruit, plantation and medicinal and aromatic crops and their management.

Practical:

Observations of disease symptoms, identification of casual organisms and host parasite relationship of important diseases. Examination of scrapings and cultures of important pathogens of fruits, plantation, medicinal and aromatic crops.

Reference Books:

1. Janardhanan, K. K. (2002). Diseases of Major Medicinal Plant, Daya Publishing House,
2. Pathak, V.N. (1981). Disease of fruit crops. Oxford & IBH Pub. Co., New Delhi.
3. Arya Arun. (2009). Disease of Fruit tree Recent Research and Ecofriendly Management, International book Distribution Co., Lucknow India.
4. Gupta, V.K. (2005). Disease of Plantation Crops, Kalyani publication New Delhi.
5. Stefend, Alfred. (2012). Disease of Fruits and nuts , Biotech, New Delhi.
6. Gupta, V.K. (2008) Disease of Fruit crops. Kalyani publication, New Delhi.



3.3 Farm Power and Machinery [AEG 211] **2 (1+1)**

Theory:

Basic concepts of various forms of energy, unit and dimensions of force, energy and power, calculations with realistic examples. IC Engines: Basic principles of operation of compression, ignition and spark ignition engines, two stroke and four stroke engines, cooling and lubrication system, power transmission system, broad understanding of performance and efficiency, tractors, power tillers and their types and uses. Electric motors: types, construction and performance comparison. Tillage: objectives, method of ploughing. Primary tillage implements: construction and function of indigenous ploughs, improved indigenous ploughs, mould board ploughs, disc and rotary ploughs. Secondary tillage implements: construction and function of tillers, harrows, levelers, ridgers and bund formers. Sowing and transplanting equipment: seed drills, potato planters, seedling transplanter. Grafting, pruning and training tools and equipment. Inter-culture equipment: sweep. Junior hoe, weeders, long handle weeders. Crop harvesting equipments: potato diggers, fruit pluckers, tapioca puller and hoists.

Practical:

Calculation on force, power and energy. IC engines – showing the components of dismantled engines and motors. Primary and secondary tillage implements, hitching, adjustments and operations. Spraying equipment, calibration and operation. Plant protection equipment, calculation of dilution ratio and operation.

Reference Books:

1. Michel A.M. and Ojha T.P. Agricultural Engineering- Vol. I and II.

3.4 Fundamentals of Entomology [ENTO 211] **3 (2+1)**

Theory:

Introduction to phylum arthropoda. Importance of class Insecta. Insect dominance. Definition, division and scope of entomology. Comparative account



of external morphology-types of mouth parts, antennae, legs, wings and genitalia. Anatomy of digestive, excretory, nervous and reproductive systems. Metamorphosis. Classification of insects upto orders and families of economic importance and their distinguished characters.

Practical:

Insect collection and preservation. Identification of important insects. General body organization of insects. Study on morphology of grasshopper. Preparation of permanent mounts of mouth parts, antennae, legs and wings. Dissection of grasshopper and caterpillar for study of internal anatomy. Observations on metamorphosis of larvae and pupae.

References books:-

1. Richard, O.W. and Davies, E.C. Imm's General Text books of Entomology. Vols. I&II. Science paper backs, Champman and Hall, London
2. Chapman, R.F. (1982) The Insect: Structure and Function. English Language Book Society/Edward Arnold, Landon.
3. Dhaliwal, G.S. (2006) An outline of Entomology. Kalyani Publishers, New Delhi.
4. Pruthi, H.S. Text books of Entomology.
5. Saxena, RC and Srivastava RC (1997) Entomology at a Glance. Agrotech Publishing Academy, Udaipur, Raj.
6. Nayar, KK and Ananthakrishnan, T.N. and B.D. David (1976) General and Applied Entomology. Tata McGraw-Hill Publishing Company Limited, New Delhi.
7. Comstock, J.H. (1984) An Introduction to Entomology. Satish Book Enterprise, Bookshellers and publishers, Moti Kutra, Agra.



3.5 Fundamentals of Plant Pathology [PPT 212] 3(2+1)

Theory:

Introduction to the science of phytopathology, its objectives, scope and historical background. Classification of plant diseases, symptoms, signs, and related terminology. Parasitic causes of plant diseases (fungi, bacteria, viruses, phytoplasma, protozoa, algae and flowering parasitic plants), their characteristics and classification. Non-parasitic causes of plant diseases. Infection process. Survival and dispersal of plant pathogens. Plant disease epidemiology, forecasting and disease assessment. Principles and methods of plant disease management. Integrated plant disease management.

Practical:

Familiarity with general plant pathological laboratory and field equipments. Study of disease symptoms and signs and host parasite relationship. Identification and isolation of plant pathogens. Koch's postulates. Preparation of fungicidal solutions, slurries, pastes and their applications.

Reference Books:

1. Singh, D.V. (2007). Introductory Plant Pathology, ICAR, Publication, New Delhi.
2. Agrios, G.N. (1995). Plant Pathology. 4th Ed. Academic Press, New York.
3. Singh, R.S. (1989). Plant Pathogens: The prokaryotes. Oxford & IBH Pub. Co., New Delhi.
4. Mehrotra, R.S. (1980). Plant Pathology. Tata McGraw Hill, New Delhi.
5. Pathak, V.N. (1984). Laboratory Manual of Plant Pathology. 2nd Ed. Oxford & IBH Pub. Co., New Delhi.
6. Tripathi, D.P. (2008). Plant Pathology at a glance , Scintific Publication India Jodhpur.
7. Chaube, Hriday (2004).Introductory Plant Pathology, International book distributor company, New Delhi.
8. Pathak,V.N. (2012) Fundamental of Plant Pathology , Agrobios , New Delhi ,India.



3.6 Human Values and Professional Ethics-I [EXT 211]

3(1+2)

Module 1: Introduction to Value Addition: Understanding the need, basic guidelines, content and process for value Education, Self- exploration-its content and process; Natural Acceptance' and Experiential Validation-as the mechanism for self exploration, Continuous Happiness and Prosperity: A look at basic human aspirations, Right understanding, Relationship and Physical Facilities: The basic requirement for fulfillment of aspirations of every human being, Understanding Happiness and Prosperity correctly: A critical appraisal of the current scenario, Method to fulfill the above human aspirations: Understanding and living in harmony at various levels

Module 2: Harmony in the Human Being: Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self (I) and 'Body': Sukh and Suvidha, Understanding the body as an instrument of 'I' (I being the doer, seer and enjoyer), Understanding the characteristics and activities of 'I' and harmony in 'I', Understanding the harmony of 'I' with the body; Sanyam and Svasthya; correct appraisal of physical needs, meaning of prosperity in detail, Programs to ensure Sanyam and Svasthya

Module 3: Harmony in the Family: Understanding harmony in the Family – The basic unit of human interaction; Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhaya-tripti; Trust (Visvasa) and Respect (Sammann) as the foundational values of relationship Understanding the meaning of *Vishwas*; Difference between intention and competence, Understanding the meaning of *Sammana*: Difference between respect and differentiation the other salient values in relationship.

Practical

Exercise 1. Introduce yourself in details, what are the goals in your life - How do you set your goals in your life - How do you differentiate between



right and wrongs - What have been your salient achievement and shortcoming in your life

Exercise 2. Now a days there is a lot of talk about many techno-genic maladies such as energy and material resource depletion, environmental pollution, global warming, ozone depletion, deforestation, soil degradation etc. All these seem to be man-made problems threatening the survival of life on Earth – what is the root cause of these maladies and what is the way out in your opinion.

Exercise 3. On the other hand, there is rapidly growing danger because of nuclear proliferation, arms race, terrorism, criminalization of politics, large scale corruption, scams, breakdown of relationships, generation gap, depression and suicidal attempts etc- What do you think is the root cause of these threats to human happiness and peace what could be the way out in your opinion

Exercise 4. Observe that each one of us has the faculty of 'Natural Acceptance', based on which one can verify what is right for him (As such we are not properly trained to listen to our 'Natural Acceptance and many a time it is also clouded by our strong pre-conditioning and sensory attractions). EXPLORE: 1) What is 'Naturally Acceptable' to you in relationship- the feeling of respect or disrespect for yourself and for others - 2) What is 'Naturally Acceptable' to you nurture or to exploit others - 3) Is your living in accordance with your natural acceptance or different from it - Out of these basic requirements for fulfillment of your aspirations- right understanding, relationship and physical facilities- observe how the problems in your family are related to each. Also observe how much time and effort you devote for each in your daily routine.

Exercise 5. List down all your important desires. Observe whether the desire is related to Self ('I') or body. If it appears to be related to body or both visualize which part of it is related to self (I) and which part is related to body.

**Exercise 6.**

- a. Observe any physical facility you use follows the given sequence with time Necessary and tasteful – unnecessary and tasteless – Intolerable
- b. In contrast, observe that any feeling in you is either naturally acceptable or not acceptable or not acceptable at all. If naturally acceptable, you want it consciously and if not acceptable, you do not want it any moment.

Exercise 7: List down all your important activities. Observe whether the activity is of 'I' or of body or with the participation of both "I" and 'Body'

Exercise 8: Observe the activities within "I" Identify the object of your attention for different moments over a period of say 5-10 minutes) and draw a line diagram connecting these points. Try to observe the link between any two nodes.

Exercise 9: Chalk out some programmes towards ensuring your harmony with the body- in terms of nurturing, protection and right utilization of the body.

Exercise 10: Film/ Documentary Shows: Selected items from internet and / or DVDs followed by thorough discussion.

References:

1. R.R. Gaur, R. Sangal, G.P. Bagaria (2009): A Foundation Course in human Values and Professional Ethics, Excel Books, New Delhi.
2. Ivan Illich (1974) Energy and equity, the Trinity Press, Worcester, and Harper Collins, USA.
3. E.F. Schumacher (1973) Small is Beautiful: a study of economics as if people mattered, Blond and Briggs, Britain.
4. Susan George (1976) How the other half dies, Penguin Press, Reprinted 1986, 1991.
5. Donella H, Meadows, Dennis L., Jorgen Randers, William W., Behrens III, 1972, Limits to Growth – Club of Rome report, Universe Books.
6. Anagraj (1998) Jeevan Vidyaek Parichay, Divya path Sansthan, Amarkantak.



7. P.L. Dhar, RR Gaur (1990) Science and Humanism. Commonwealth Publishers.
8. A.N. Tripathy (2003) Human Values, New Age International Publishers.
9. SubhashPalekar (2000) How to practice natural Farming, Pracheen (Vaidik) Krishi TantraShodh, Amravati.
10. E.G. Seebauer and Robert L. Berry (2000) Fundamentals of Ethics for Scientists and Engineers, Oxford University Press
11. M.Govindrajran, S Natrajan and V.S. Senthil Kumar, Engineering Ethics (including human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
12. B.P. bannerjee (2005) Foundations of Ethics and Management, Excel Books.
13. B.L.Bajpai (2004) Indian Ethos and Modern Management, New Royal book Co. Lucknow, Reprinted (2008).

3.7 Nematode Pests of Horticultural Crops and Their Management [NEMA 211] 2(1+1)

History of development of Nematology - definition, economic importance. General characters of plant parasitic nematodes, their morphology, taxonomy, classification, biology, symptomatology and control of important plant parasitic nematodes of fruits - (tropical, sub-tropical and temperate) vegetables, tuber, ornamental, spice and plantation crops. Role of nematodes in plant disease complex.

Practical:

Methods of sampling and extraction of nematodes from soil and plant parts, killing, fixing and preparation of temporary and permanent nematode mounts. Nematicides and their uses. Collection and preservation of 20 plant species/parts damaged by plant parasitic nematodes.

Reference Books:

1. Walia, R.K. and Bajaj, H.K. (2003). Text book of Introductory Plant Nematology, ICAR, New Delhi.
2. Jonathan, E.I. (2010). Nematology: Fundamental and Application, NIPA. New Delhi



3. Ready, P.P. (2012). Integrated Nematode Management in Horticultural crops, scientific publication, Jodhpur.
4. Parihar, Aruna, (2010). Plant Pathology and Nematology: Objective and Fundamental, Agrotech publisher Academic, Udaipur
5. Sharma, G.L. (2011). Phyto-Nematodes in crops, NIPA, New Delhi.
6. Walia, Raman (2013). Introductory, Nematology, ICAR, New Delhi.

3.8 Temperate Fruits [FSC 211] 2(1+1)

Classification of temperate fruits, detailed study of areas, production, varieties, climate and soil requirements, propagation, planting density, cropping systems, after care training and pruning, self incompatibility and pollinisers, use of growth regulators, nutrient and weed management, harvesting, post-harvest handling and storage of apple, pear, peach, apricot, cherry, persimmon, strawberry, kiwi, Queens land nut (Macadamia nut), almond, walnut, pecan nut, hazel nut and chest nut. Re- plant problem, rejuvenation and special production problems like pre-mature leaf fall, physiological disorders, important insect – pests and diseases and their control measures.

Practical:

Nursery management practices, description and identification of varieties of above crops, manuring and fertilization, planting systems, preparation and use of growth regulators, training and pruning in apple, pear, plum, peach and nut crops. Visit to private orchards to diagnose maladies. Working out economics for apple, pear, plum and peach.

Reference books:

1. Chattopadhyay, T.K (2000). A Text book of Pomology Vol-IV, Temperate Fruits. Kalyani Publishers, Rajendra Nagar, Ludhiana.
2. Chadha, T.R. (2002) Textbook of Temperate fruits. ICAR New Delhi.
3. Mitra, S.K., Rathore, D.S. and Bose, T.K. (2003) Temperate Fruits. Horticulture & allied Publisher Calcutta. India.



4. David Jackson, Norman Earl Looney, Michael Morley-Bunke (2011). Temperate and subtropical fruit production. CABI.
5. Singh, Amar (2000). Fruit physiology and production. Kalyani publishers, Ludhiana.

3.9 Temperate Vegetables [VSC 211] 2(1+1)

Importance of cool season vegetable crops in nutrition and national economy. Area, production, export potential, description of varieties and hybrids, origin, climate and soil, production technologies, seed production, post-harvest technology. Marketing of cabbage, cauliflower, knol-khol, sprouting broccoli, Brussels' sprout, lettuce, palak, Chinese cabbage, spinach, garlic, onion, leek, radish, carrot, turnip, beet root, peas, broad beans, rhubarb, asparagus, globe artichoke.

Practical:

Identification and description of varieties/hybrids; propagation methods, nursery management; preparation of field, sowing/transplanting; identification of physiological and nutritional disorders and their corrections; post-harvest handling; cost of cultivation and field visits to commercial farms.

Reference books:

1. Chadha, K.L. (2001). Hand Book of Horticulture. ICAR, New Delhi
2. Singh, D.N. and Nath, Vishal (2012). Winter Vegetables :Advances and Developments. Satish Serial Publishing House, Delhi
3. Bose, T. K. and Som, M.G. (1986). Vegetable Crops in India. Naya Prokash, Calcutta-6
4. Bose, T.K., Kabir J., Maity, T.K. Parthasarthy, V.A. and Som, M.G. (2003). Vegetable Crops, Vol.I-III Naya Udyog Kolkatta.
5. Singh, S.P. (1989). Production Technology of Vegetable Crops. ARCC, Sadar Karnal
6. Fageria, M.S., Choudhary, B.R. and Dhaka, R.S. (2000). Vegetable Crops : Production Technology. Kalyani Publishers, New Delhi



3.9 Weed Management in Horticultural Crops [AGRO 211] 2(1+1)

Weeds: Introduction, harmful and beneficial effects, classification, propagation and dissemination; Weed biology and ecology, crop weed association, crop weed competition and allelopathy. Concepts of weed prevention, control and eradication; Methods of weed control: physical, cultural, chemical and biological methods. Integrated weed management; Herbicides: advantages and limitation of herbicide usage in India, Herbicide classification, formulations, methods of application; Introduction to adjuvants and their use in herbicides; Introduction to selectivity of herbicides; Compatibility of herbicides with other agro chemicals; Weed management in major field and horticultural crops, shift of weed flora in cropping systems, aquatic and problematic weeds and their control.

Practical:

Identification of weeds; Survey of weeds in crop fields and other habitats; Preparation of herbarium of weeds; Calculations on weed control efficiency and weed index; Herbicide label information; Computation of herbicide doses; Study of herbicide application equipment and calibration; Demonstration of methods of herbicide application; Preparation of list of commonly available herbicides; Study of phytotoxicity symptoms of herbicides in different crops; Biology of nut sedge, bermuda grass, *Parthenium* and *Celosia*; Economics of weed control practices; Tours and visits of problem areas.

Reference Books:

1. Thakur, C. 1984. Weed Science. Metropolitan, New Delhi
2. Gupta, O.P. and Lamba, P.S. 1978. Modern Weed Science in the Tropical and Sub tropical: Today and Tomorrow. New Delhi.
3. Rao, V.S. 1982. Principles of Weed Science. Oxford & IBH, New Delhi.
4. Gupta, O.P. 1993. Scientific Weed Management: Today and Tomorrow. Printers and Publishers, Bikaner.
5. Rao, V.S. 1992. Principles and Practices. Oxford and IBH publishing Co. pvt. Ltd, New Delhi.
6. Somani, L.L. 1992. Dictionary of Weed Science. Agritech Publishing of Academy, Udaipur.
7. Shanmugavelu, P. Weed management of Horticultural crops. Agrobotaical Publishers, Bikaner.
8. Mandal, R.C. Weed, Weedicides and weed control: Principals and Practices